Woodward-Clyde Consultants

FINAL REPORT ON THE 8T REMEDIATION AT THE DOUGLAS AIRCRAFT COMPANY TORRANCE (C6) FACILITY

Prepared by:

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Project No. 8741863D
4 March 1988

(L-ABC/DAC8T)

Mr. Jeff Copeland 4 January 1988

that the required level of soil compaction had been achieved. With lean concrete, no compaction tests will be necessary except from the surface to a depth of two feet. No shoring is required in an excavation of this depth.

Soil put back into the excavation will have petroleum hydrocarbon concentrations less than 100 mg/kg. Most of the soil already excavated contains hydrocarbon concentrations of less than 10 mg/kg. Once the excavation has been filled and compacted, a low permeability asphalt cover will be put in place. This asphalt cover will incorporate a fabric liner, which will increase its strength and reduce its water permeability.

The bottom of the excavation will be sampled, and the samples analyzed for hydrocarbons, prior to backfilling. The results of the soil analyses and compaction tests will be submitted to the LARWQCB for review after the job has been completed. The Board will be kept verbally appraised of the remediation as it progresses.

Very truly yours,

WOODWARD-CLYDE CONSULTANTS

Alistaire Callender, Ph.D.
Project Manager
(ABC/Copeland)

AC:lk

cc: Janet Bell, Douglas Aircraft Company
Ben Warren, Douglas Aircraft Company
Bob Fassbender, Douglas Aircraft Company

FINAL REPORT ON THE 8T REMEDIATION AT THE DOUGLAS AIRCRAFT COMPANY TORRANCE (C6) FACILITY

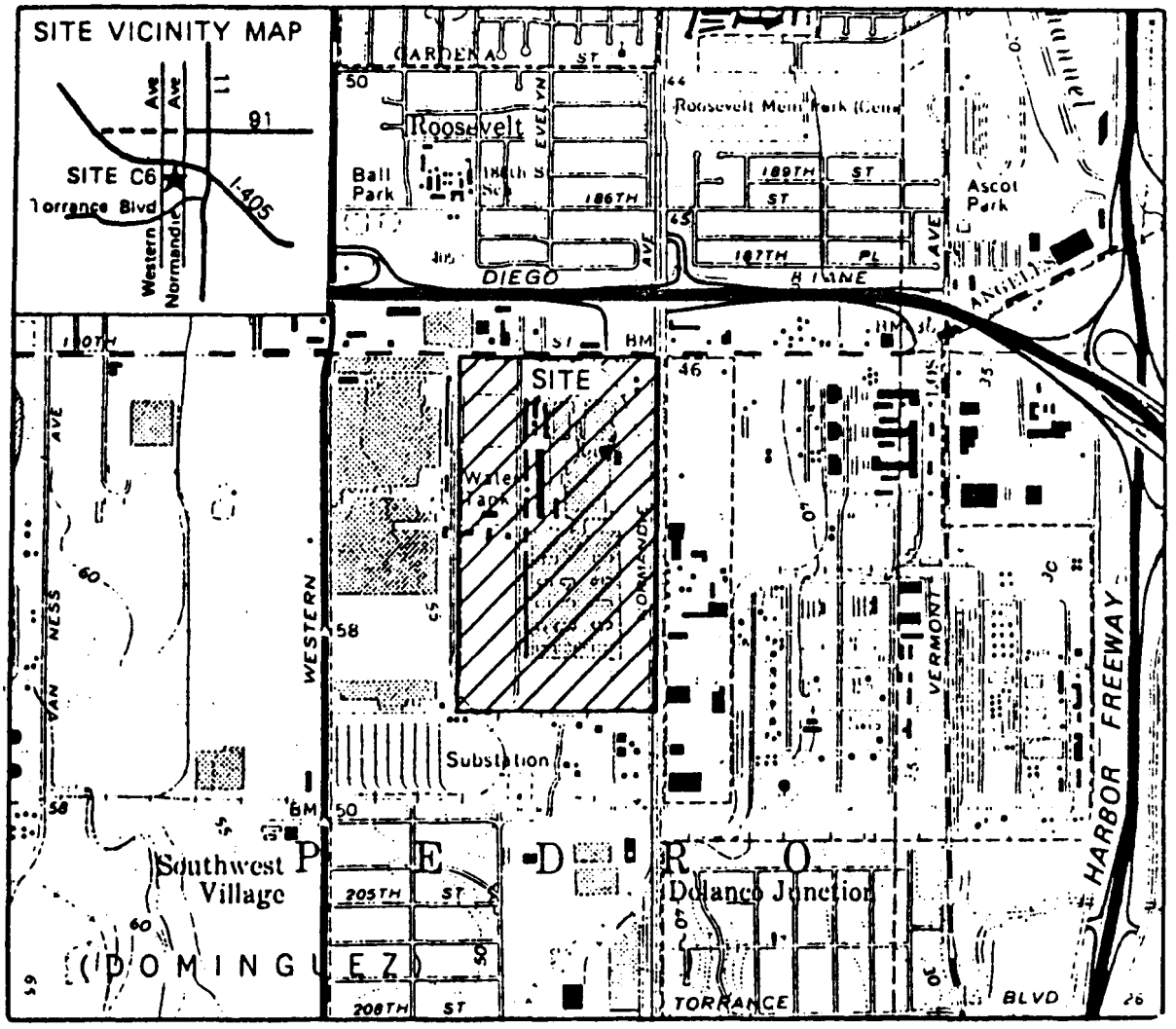
1.0 INTRODUCTION

The purpose of this report is to present the results of the investigation conducted at Tank 8T at Douglas Aircraft Company's C6 facility, and the method of remediation that was implemented. The sequence of activities leading to the remediation is discussed in this section. In the other sections of this report, a discussion of the field operations conducted, and the analytical results obtained during the program are discussed.

On 11 March 1987, petroleum hydrocarbon odors were noticed during the removal of Tank 8T at the Torrance, C6 facility (see Figure 1). Tank 8T was a 10,000 gallon waste coolant tank. During the removal of an adjacent concrete sump that drained into the tank, approximately 200 to 400 gallons of liquid were released into the north end of the excavation.

On 11 and 17 March, 1987, six soil samples were collected from the bottom of the excavation by personnel working for Macco Construction Company. The analytical results obtained from these soil samples indicated that hydrocarbons were present in the soil, but they were limited to the north end of the excavation. Laboratory analysis reports of these soil samples are presented in Appendix C.

Woodward-Clyde Consultants conducted a preliminary investigation to evaluate the vertical extent of hydrocarbons. This investigation involved drilling two angled borings (B-1



C6 FACILITY

Project: DOUGLAS AIRCRAFT CO. **Project No.** 41863A	C6 FACILITY LOCATION MAP	Fig. 1

WOODWARD-CLYDE CONSULTANTS

and B-2) under the north end of the excavation, and one angled boring (B3) under the south end of the excavation. Figure 2 presents the boring locations. Results from this investigation are presented in Woodward-Clyde Consultants' report "Evaluation of the Presence of Petroleum Hydrocarbons in the Subsurface at Tank 8T at DAC's Torrance Facility," dated August 1987. Analytical results from soil samples collected from borings B-1, B-2, and B-3 indicated that the petroleum hydrocarbons were limited to the north end of the excavation, and extended to a vertical depth of approximately 15 to 20 feet below the bottom of the excavation (31 feet below grade). A summary of the soil hydrocarbon concentrations is presented in Table 1. Analytical results and chain-of-custody forms are presented in Appendix D.

Woodward-Clyde Consultants initially recommended excavating the soil with elevated hydrocarbon concentrations and remediating the soil by the Ensotech treatment process. This process basically involves mixing the soil with liquid hydrogen peroxide and a catalyst, resulting in the oxidization of the hydrocarbons to carbon dioxide and water. A Variance Application for a permit to conduct on-site treatment of hazardous waste was submitted to the California Department of Health Services (DHS). The permit was never approved for this process because of unresolved issues between the state and local regulatory health agencies regarding who would approve variance applications (telephone conversation of 19 November 1987 between Alistaire Callender of Woodward-Clyde Consultants and Susan Romero of the DHS). Because a variance could not be obtained, the soil with elevated hydrocarbon concentrations was disposed of at the Imperial Valley Landfill, and was not remediated on-site as initially intended.

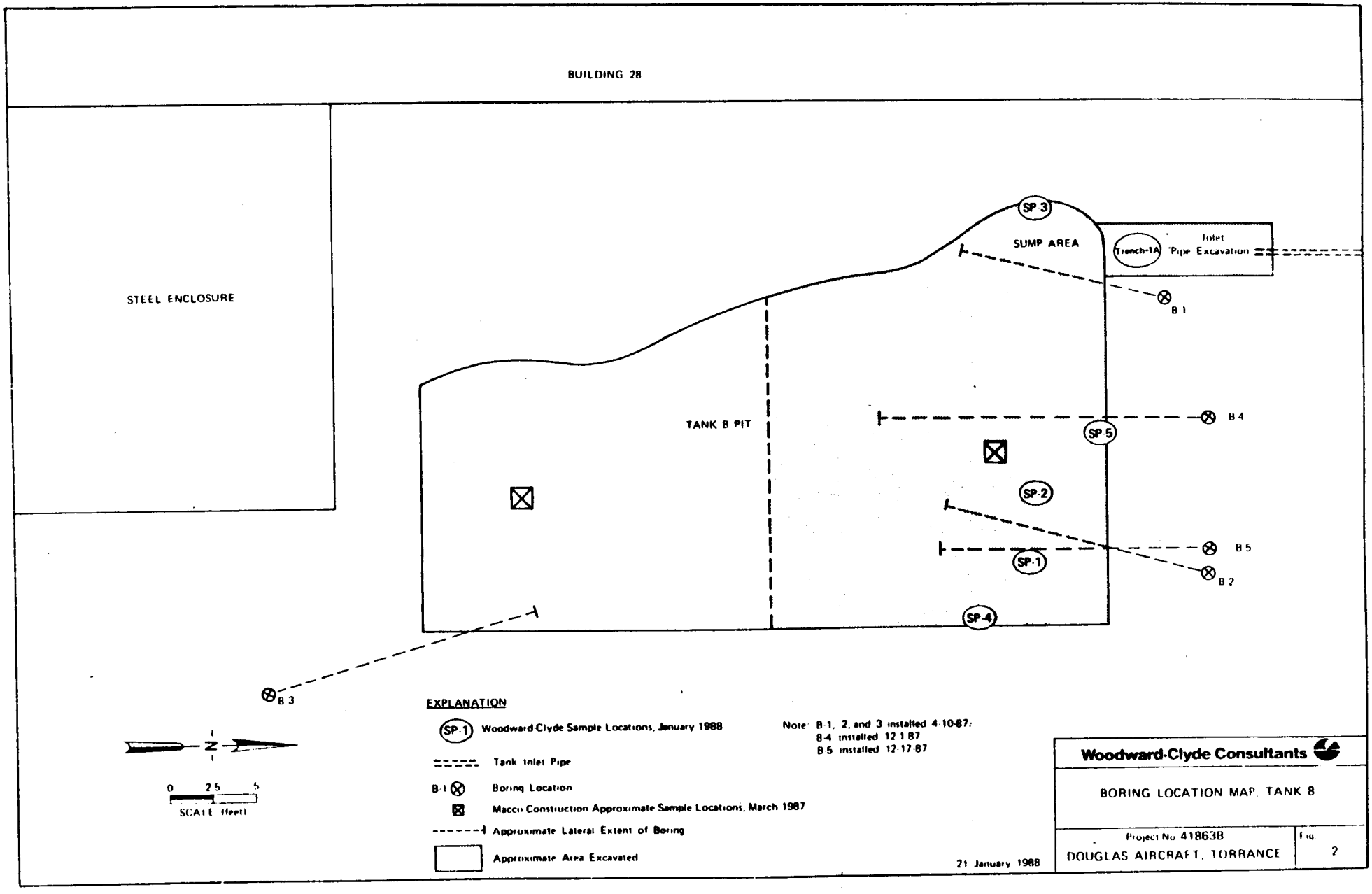


TABLE 1

SOIL PETROLEUM HYDROCARBON CONCENTRATIONS
(mg/kg)

Boring Number	Sample Date	Sample Number	Depth[1] (ft)	Gasoline	Diesel Fuel	Kerosene	Mineral Spirits	C_{18}-C_{30+} Hydrocarbons
B1	4/10/87	3	12	ND[2]	ND	3030	ND	1300
B1	4/10/87	5	18	ND	ND	ND	ND	ND
B1	4/10/87	6	21	ND	ND	ND	ND	ND
B1	4/10/87	7	26	ND	ND	ND	ND	ND
B2	4/10/87	2	12	ND	ND	ND	ND	ND
B2	4/10/87	3	17	ND	ND	ND	ND	ND
B2	4/10/87	4	22	ND	ND	9500	ND	9700
B2	4/10/87	5	27	ND	ND	1900	ND	2800
B2	4/10/87	6	31	ND	ND	ND	ND	4600
B2	4/10/87	7	38	ND	ND	ND	ND	ND
B3	4/10/87	1	21	ND	ND	ND	ND	ND
B3	4/10/87	2	26	ND	ND	ND	ND	ND
B3	4/10/87	3	30	ND	ND	ND	ND	ND
B4	12/1/87	3	12	ND	ND	NO	ND	ND
B4	12/1/87	4	17	ND	ND	ND	ND	ND
B4	12/1/87	5	22	ND	ND	6400	ND	27,000
B4	12/1/87	6	27	ND	ND	72	ND	360
B4	12/1/87	7	32	ND	ND	ND	ND	ND
B5	12/17/87	1	17	ND	ND	ND	ND	ND
B5	12/17/87	2	22	ND	ND	150	ND	1000
B5	12/17/87	3	27	NO	ND	1100	ND	5800
B5	12/17/87	4	32	ND	ND	4200	NO	5900
B5	12/17/87	5	37	ND	ND	ND	ND	ND
SP	4/10/87	1	--	ND	ND	ND	ND	310
SP	4/10/87	2	--	NO	ND	ND	ND	680
8TPL	12/1/87	3	--	ND	ND	ND	ND	ND
8TPL	12/1/87	5	--	ND	NO	ND	ND	ND
8TPL	12/1/87	7	--	ND	ND	ND	ND	ND
Sample	12/17/87	1	--	ND	ND	ND	ND	550
Sample	12/17/87	2	--	ND	ND	ND	ND	540
Sample	12/17/87	3	--	ND	ND	ND	ND	ND
SP	1/5/88	1	30	ND	ND	ND	ND	ND
SP	1/5/88	2	35	ND	ND	NO	ND	160
SP	1/5/88	3	22	ND	ND	ND	ND	ND
SP	1/5/88	4	30	ND	ND	ND	ND	ND
SP	1/5/88	5	35	ND	ND	ND	ND	ND
Trench	1/8/88	1A	8	ND	ND	ND	ND	ND
Detection Limit			10	10	10	10	100	

1 Depth to nearest foot

2 Not Detected

(L-ABC/DAC8T-1)

2.0 APPROACH

The approach to remediating the soil at Tank 8T involved four tasks. Task I included drilling two additional borings (B4 and B5) and soil sampling at the north end of the excavation, to further evaluate the vertical extent of hydrocarbons in the soil. Task II involved the actual excavation of soil from the north end of the excavation using as a guide, OVA headspace readings, and laboratory analysis of soil samples from the excavation, and visual observations of the soil. Task III involved the collection of samples from the sidewalls and bottom of the excavation to evaluate if all of the soil with elevated hydrocarbon concentrations had been removed. Task IV included backfilling the excavation with a cement slurry to provide a backfill material that would not require compaction. This general approach was submitted in a letter to Mr. Jeff Copeland of the Los Angeles Regional Water Quality Control Board, dated 29 December 1987, and verbally approved by Mr. Copeland on 31 December 1987. A copy of this letter is attached as Appendix E.

3.0 FIELD OPERATIONS

3.1 Task I

As a part of Task I, two additional borings (B-4 and B-5) were drilled on 1 and 17 December 1987. The locations of borings B-4 and B-5 are shown in Figure 2. Drilling for both borings was conducted by A&R Drilling, Inc. using a CME 75 drill rig with 7-inch O.D. hollow stem augers. Soil samples were collected at approximately 5-foot intervals using a modified California sampler, and sealed in brass tubes. Appendix A presents additional information on the field procedures. Boring Logs for B-1 through B-5 are presented in Appendix B. Soil samples were selected for

analyses based on Organic Vapor Analyzer (OVA) headspace readings and field observations. The soil samples were analyzed for petroleum hydrocarbons by EPA Method 8015 modified. Analytical data and chain-of-custody forms from borings B-4 and B-5 are provided in Appendix D and summarized in Table 1. Analytical data from B-4 and B-5 indicated the presence of hydrocarbons to a vertical depth of 32 to 35 feet below the ground surface.

3.2 Task II

Task II involved the excavation of soil from 8T on 4 January 1988 by G.L. Patterson Equipment, Inc. A GradeAll G-1000 with a superboom extension was used for excavating the soil. The soil to be excavated could be generally identified by its greenish-gray color. An OVA was used during the excavation to obtain headspace readings from the soil, and to assist in evaluating if hydrocarbons were present.

3.3 Task III

Task III was completed on 5 January 1988 and consisted of the collection of five soil samples from the sidewalls and the bottom of the excavation. The task objective was to evaluate whether all the soil with elevated hydrocarbons had been removed. On 5 January 1988, samples SP-1 and -2 were collected from the bottom of the excavation, while SP-3, -4, and -5 were collected from the sidewalls. Analytical results obtained from SP-1, -2, -3, -4, and -5 are presented in Appendix D and summarized in Table 1. The sampling locations of SP-1, -2, -3, -4, and -5 are presented on Figure 2.

During excavation of the northwest sidewall, a cast-iron 4 to 5 inch diameter tank inlet pipe was exposed, approximately 6 to 7 feet below grade. A 6- to 12- inch

band of greenish-gray staining was observed directly below the pipe. On 8 January 1988, 10 feet of the tank inlet pipe was removed by California Backhoe, Inc. The excavated trench was approximately 8 feet in depth. A greenish-gray discoloration was observed 6 to 12 inches below the pipe and 6 to 8 feet laterally into the trench backfill. One soil sample (Trench-1A) was collected from below the discolored soil at a depth of approximately 8 feet to evaluate the vertical extent of hydrocarbons. Soil with elevated OVA headspace measurements was removed from the excavation. Analytical results for soil sample Trench 1A are presented in Appendix D and summarized in Table 1. Figure 2 illustrates the sampling location.

3.4 Task IV

Task IV activities consisted of backfilling and resurfacing the excavation, and were initiated after the analytical results confirmed that soil with elevated hydrocarbons had been removed. On 6 January 1988, A&A Ready Mix Concrete, Inc. poured 400 cubic yards of a 2-sack cement slurry into the 8T excavation. The slurry was placed to a level about 4-1/2 feet below the existing grade. On 12 January 1988, 3 feet of soil was compacted over the cement slurry. The upper 1 foot of soil was compacted to at least 95 percent of the maximum dry density, as determined in accordance with ASTM Test Method D1557 (i.e., 95 percent relative compaction). Soil used for compaction was taken from the "clean" soil (soil with no detectable petroleum hydrocarbons) that was removed from the excavation. Analytical results from soil samples collected from the soil piles are discussed in Section 3.5. The excavation was resurfaced with 5 to 6 inches of asphalt, over 10 to 12 inches of crushed aggregate base material on 19 January 1988 by

TABLE 2

FIELD DENSITY TEST RESULTS

JOB NAME: Douglas Aircraft Company, Torrance, 8T Excavation
JOB NUMBER: 8741863D

Date	Test Number	Location	Field Moisture % Dry Weight	Field Dry Density (pcf)	Laboratory Maximum Dry Density (pcf)	Relative Compaction % of Lab Density
12 January 1988	1	8T Pad	18.5	118	121	98
12 January 1988	2	8T Pad	19.0	120	121	99
12 January 1988	3	8T Pad	15.5	116	121	96
12 January 1988	4	8T Pad	17.5	120	121	99
18 January 1988	5	8T Pad	16.0	115	121	95
18 January 1988	6	8T Pad	16.0	113	121	93
19 January 1988	7	Base Material	6.0	136	143	95
19 January 1988	8	Base Material	6.0	142	143	99
19 January 1988	9	Base Material	6.0	137	143	96

(L-ABC/DAC8T-T2)

Sully-Miller Contractors. The crushed aggregate base material was compacted to at least 95 percent relative compaction (see Table 2).

Laboratory soil compaction tests were conducted on three soil samples, SK-1, -2, and -3 to estimate the maximum dry density and the optimum moisture content (see Table 3). Soil samples SK-1 and SK-2 were from the "clean" soil pile used for compaction from 1-1/2 to 4-1/2 feet below grade, and soil sample SK-3 was from the crushed aggregate base material.

3.5 Soil Stockpile

Soil excavated from the 8T excavation was segregated into two piles. The soil with elevated petroleum hydrocarbons was evaluated and segregated by OVA headspace measurements, visual discoloration, hydrocarbon odor, and laboratory analysis.

Eight soil samples from the soil stockpiles were analyzed for petroleum hydrocarbons by EPA Method 8015 modified. Soil samples (SP-1, SP-2, Sample-1 and Sample -2) were collected on 10 March 1987, and 17 December 1987, respectively. These soil samples were collected from the "dirty" soil stockpile and ranged in concentration from 310 to 680 mg/kg of C_{18}-C_{30+} hydrocarbons. Soil samples 8TPL-3, 5, 7, and Sample-3 were collected on 1 December 1987 and 17 December 1987, respectively. These samples were collected from the "clean" soil stockpile and did not indicate the presence of petroleum hydrocarbons (i.e., hydrocarbons were not detected). Analytical results are summarized in Table 1, and laboratory data sheets are presented in Appendix D. Approximately 180 cubic yards of soil with elevated

TABLE 3

LABORATORY COMPACTION TEST[1] RESULTS

Sample	Soil Type[2]	Maximum Dry Density (pcf)	Optimum Moisture Content (%)
SK-1	Silty Clay (CL)	122	11.5
SK-2	Silty Clay (CL)	127	10.0
SK-3	Base Material	143	4.5

1 ASTM Test Method D1557

2 Unified Soil Classification given in parenthesis

hydrocarbon concentrations were removed from the 8T excavation. The soil was taken to a landfill in Imperial Valley, California on 25 and 26 January 1988.

4.0 SUMMARY

Analytical results were obtained from samples collected from borings B-4 and B-5 installed on 1 December and 17 December 1987, and indicated a maximum vertical depth of petroleum hydrocarbons of 32 to 35 feet below grade. Soil from the north end of the 8T excavation was removed to a depth of approximately 35 feet below grade on 4 January 1988. Five soil samples were collected on 5 January 1988 from the sidewalls and bottom of the excavation to confirm that the soil containing hydrocarbons had been removed from the excavation. Analytical results did not indicate detectable quantities of petroleum hydrocarbons in samples SP-1, -3, -4, and -5. Sample SP-2 indicated the presence of 160 mg/kg of C_{15}-C_{30} hydrocarbons at the bottom of the excavation. Analytical results from the soil sample, Trench 1A, collected from below the 8T tank inlet pipe did not indicate the presence of hydrocarbons. A summary of the analytical results are listed in Table 1, and Appendix D presents the laboratory data sheets. Soil from the excavation was segregated into "clean" and "dirty" stockpiles. Soil samples collected from the "dirty" stockpile indicated the presence of hydrocarbons ranging from 310 to 680 mg/kg. Soil samples from the "clean" stockpile do not indicate the presence of hydrocarbons. An estimated 180 cubic yards of soil containing hydrocarbons was removed from the tank and inlet pipe excavations and hauled to Imperial Valley Landfill on 25 and 26 January 1988 by IT Corporation.

On 6 January 1988, Mr. Jeff Copeland of the Los Angeles Regional Water Quality Control Board, visited the 8T site to inspect the soil excavation and to review analytical data obtained from soil samples SP-1, -2, -3, -4, and -5. Mr. Copeland verbally approved that the excavation had sufficiently removed the hydrocarbons from the soil, and that the excavation could be backfilled.

The excavation was backfilled with 400 cubic yards of a 2 sack cement slurry to 4-1/2 feet below grade and with 3 feet of soil compacted to 95 percent to 1-1/2 feet below grade. The excavation was resurfaced and brought to grade with 5 to 6 inches of asphalt over 10 to 12 inches of crushed aggregate base material.

APPENDIX A

FIELD PROCEDURES

APPENDIX A

FIELD PROCEDURES

A.1 GENERAL INFORMATION

Drilling was performed by A & R Drilling, Inc. of Carson, California. Borings B-1, -2, and -3 were auger drilled on 10 April 1987. Boring B-4 and B-5 were drilled on 1 December 1987 and 17 December 1987, respectively. Borings were drilled using a CME 75 with a 7-inch hollow stem auger.

A.1.1 Soil Borings

Soil borings were generally drilled from 30 to 50 feet in depth. Borings were backfilled with a dry mixture of 75 percent No. 60 Silica sand and 25 percent of bentonite powder after completion of soil sampling. The dry mixture of bentonite and sand serves as a low permeability plug to minimize water infiltration through the borehole. The top 6 inches of the borings were backfilled with asphalt.

A.1.2 Drill Cuttings

Drill cuttings from each boring were placed in 55-gallon drums. The contents of the drums were labeled using an identification label and permanent ink marker. The drums were sealed and left adjacent to the boring locations. Douglas Aircraft was advised of the locations and contents of the drums, and the need for proper management of the drill cuttings.

A.2 SOIL SAMPLING

Subsurface soil samples were collected at about 5-foot intervals. The Boring Logs, presented in Appendix B, illustrate the soil sampling locations for each boring. Soil samples were taken for Organic Vapor Analyzer (OVA) headspace measurements and laboratory analyses. The soil samples were collected using a modified California sampler for borings drilled by the CME 75. The modified California sampler holds four brass tubes, and is 18 inches in length.

Soil samples from the soils pile stockpiled adjacent to the excavation were collected by the "grab" sampling method. This method simply involved packing loose soil from the stockpile into a brass tube for laboratory analysis.

A.2.1 OVA Headspace Measurements

Field OVA headspace measurements were taken from each soil sample. This procedure was conducted by extruding approximately one brass or stainless steel tube from each soil sample into a one pint glass jar. The jar's lid had a 1/4-inch diameter hole, which was sealed with duct tape. Approximately 10 minutes were allowed for organic vapors from the soil to reach equilibrium inside the jar. An OVA probe was then inserted through the hole in the jar, and the vapor concentration was measured.

A.2.2 Soil Sample Preparation

One to two tubes from the soil sampler were prepared for laboratory analysis. The ends of the tubes were covered with aluminum foil, plastic end caps, and sealed with electrical tape. Soil samples were labeled with the following information:

- Project number
- Project name
- Boring number
- Sample number
- Soil depth
- Sampler's signature
- Date

The soil samples were then sealed in Ziploc plastic bags and placed on ice in an ice chest. All of the soil samples were delivered to West Coast Analytical Service, Inc. in Santa Fe Springs for laboratory analysis. Chain-of-custody procedures, including the use of sample identification labels and chain-of-custody forms, were used for tracking the collection and shipment of soil samples. The chain-of-custody forms are presented in Appendix D.

A.2.3 Field Observations

Observations by Woodward-Clyde Consultants' personnel during the drilling and sampling operations were recorded on Boring Logs, as presented in Appendix B. A qualified geologist recorded observations related to visual soil classifications, geologic and stratigraphic comments, sampling efforts, OVA measurements, and other pertinent information.

APPENDIX B

BORING LOGS

BORING LOCATION	B-1 (8T) See figure 2	ELEVATION AND DATUM	Not Available
DRILLING AGENCY	A & R Drilling / DRILLER S. Kosfer	DATE STARTED 4-10-87	DATE FINISHED 4-10-87
DRILLING EQUIPMENT	CME 75, 7-inch O.D., H.S.A.	COMPLETION DEPTH (FT) 30	ROCK DEPTH (FT) –
DIAMETER AND TYPE OF WELL CASING	N/A	NO OF SAMPLES: DIST –	UNDIST 7 / CORE –
TYPE OF PERFORATION	N/A	WATER DEPTH (FT): FIRST –	COMPL – / 24 HRS –
TYPE OF PERFORATION / BACKFILL	80% No. 60 Silica Sand and 20% Bentonite Powder	LOGGED BY B. Jacobs	CHECKED BY M. Razmdjoo
TYPE OF SEAL	Asphalt		

DEPTH (FEET)	DESCRIPTION	GRAPHIC LOG: Lithology	GRAPHIC LOG: Observation Well	SAMPLES: OVA (ppm)	SAMPLES: No	SAMPLES: Type	SAMPLES: Blow Count	SAMPLES: Drilling Rate/Time	REMARKS
0	Asphalt								Background OVA reading = 1-2 ppm
	Damp, light olive, very fine to medium grained SAND (SW-SM) with little silt.			4	1				
5									
	Damp, olive, SILTY CLAY (CL) with some fine sand.			4	2				Oily Odor
10									
	Damp, olive with black mottling, CLAYEY SILT (ML) with fine sand.			16	3				Oily Odor
15									
	Damp, reddish brown, SANDY SILT (MC).			26	4				Oily Odor
20				64	5				
	Increasing sand.								
				14	6				Oily Odor
25	Becoming clayey.								
				13	7				Slight Odor
30	Bottom of Boring at 30 feet. Total Vertical Depth at 27 feet.								Boring drilled at 25° from vertical. Bearing S15 W
35									

Project: DOUGLAS AIRCRAFT TORRANCE
Project No.: 41863B

B-1 (8T) LOG OF BORING

Fig A-

LA/OR-0783-236R

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BORING LOCATION	B-2 (8T) See Figure 2	ELEVATION AND DATUM	Not Available
DRILLING AGENCY	A & R Drilling	DRILLER S. Kosfer	DATE STARTED 4-10-87	DATE FINISHED 4-10-87
DRILLING EQUIPMENT	CME 75, 7-inch O.D., H.S.A.	COMPLETION DEPTH (FT) 45	ROCK DEPTH (FT) –
DIAMETER AND TYPE OF WELL CASING	N/A	NO OF SAMPLES: DIST –	UNDIST 8	CORE –
TYPE OF PERFORATION	N/A	WATER DEPTH (FT): FIRST –	COMPL –	24 HRS –
TYPE OF BACKFILL	80% No. 60 Silica Sand and 20% Bentonite Powder	LOGGED BY B. Jacobs	CHECKED BY M. Razmdjoo
TYPE OF SEAL	Asphalt		

DEPTH (FEET)	DESCRIPTION	GRAPHIC LOG: Lithology	GRAPHIC LOG: Observation Well	SAMPLES: OVA (ppm)	SAMPLES: No	SAMPLES: Type	SAMPLES: Blow Count	SAMPLES: Drilling Rate/Time	REMARKS
	Asphalt								Background OVA reading = 1.5 ppm
	Damp, reddish-brown, SANDY SILT (ML) with some clay.								
5	Damp, dark brown to black, SILTY CLAY (CL).								
	Damp, olive, SILTY CLAY (CL).								
	Damp, reddish-brown, SILTY CLAY (CL).			2.4	1				
10									
	Damp, light olive, CLAYEY SILT (ML).			5	2				Slight Odor
15									
				80	3				Moderate Odor
20	Damp, dark olive with greenish-black staining, CLAYEY SILT (ML).								
				120	4				Moderate Odor
25									
	▼ Becoming more clayey.			120	5				Moderate Odor
30									
	Damp, reddish-brown, fine grained SAND (SP-SM) with little silt.			40	6				Slight Odor
35									

Project: DOUGLAS AIRCRAFT TORRANCE Project No.: 41863B	B-2 (8T) LOG OF BORING	Fig. A

DEPTH (FEET)	DESCRIPTION	GRAPHIC LOG: Lithology	GRAPHIC LOG: Observation Well	GRAPHIC LOG: OVA (ppm)	SAMPLES: No	SAMPLES: Type	SAMPLES: Blow Count	SAMPLES: Drilling Rate/Time	REMARKS
40	Damp, reddish-brown, very fine grained SAND (SP-SM) with little silt (continued).			2.0	7	X			No Odor
				2.4	8	X			No Odor
45	Bottom of Boring at 45 feet. Total Vertical Depth at 42 feet.								Boring drilled at 21° from vertical. Bearing S12.5 W.
50									
55									
60									
65									
70									
75									

Project: DOUGLAS AIRCRAFT TORRANCE
Project No.: 418638

B-2 (8T) CONT. LOG OF BORING

Fig. A-3

LA/OR-0783-236R

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BORING LOCATION	B-3 (8T) See Figure 2	ELEVATION AND DATUM	Not Available
DRILLING AGENCY	A & R Drilling	DRILLER S. Kosfer	DATE STARTED 4-10-87 / DATE FINISHED 4-10-87
DRILLING EQUIPMENT	CME 75, 7-inch O.D., H.S.A.	COMPLETION DEPTH (FT) 35	ROCK DEPTH (FT) –
DIAMETER AND TYPE OF WELL CASING	N/A	NO OF SAMPLES: DIST –	UNDIST 3 / CORE –
LOCATION OF PERFORATION	N/A	WATER DEPTH (FT): FIRST –	COMPL – / 24 HRS –
TYPE OF PERFORATION			
BACKFILL	80% No. 60 Silica Sand and 20% Bentonite Powder	LOGGED BY B. Jacobs	CHECKED BY M. Razmadjoo
TYPE OF SEAL	Asphalt		

DEPTH (FEET)	DESCRIPTION	GRAPHIC LOG: Lithology	GRAPHIC LOG: Observation Well	OVA (ppm)	SAMPLES: No	SAMPLES: Type	SAMPLES: Blow Count	SAMPLES: Drilling Rate/Time	REMARKS
	Asphalt								Background OVA reading = 2.4 ppm
	Damp, reddish-brown, SANDY SILT (ML) with some gravel.								
	Damp, dark brown, CLAYEY SILT (ML) with some sand.								
5									
10									
15									
	Damp, olive, CLAYEY SILT to SILTY CLAY (ML-CL).								
20									
25				7.0	1	X			Slight to no odor.
30				8.0	2	X			Slight to no odor
	Damp, brown, fine grained SAND (SP-SM) with little silt.			4.6	3	X			No Odor
35	Bottom of Boring at 35 feet. Total Vertical Depth at 31.5 feet.								Boring drilling at 25 fr vertical. Bearing N16 W.

Project: DOUGLAS AIRCRAFT TORRANCE Project No.: 41863B	B-3 (8T) LOG OF BORING	Fig. A

LA/OR-0783-236R

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BORING LOCATION	19.3' N. Bldg. 28 & 6' N. of Excavation (See Figure)		ELEVATION AND DATUM	Not Surveyed	
DRILLING AGENCY	A & R Drilling, Inc.	DRILLER M. Smith	DATE STARTED	12-1-87	DATE FINISHED 12-1-87
DRILLING EQUIPMENT	CME 75		COMPLETION DEPTH (ft)	50.6	ROCK DEPTH (ft) –
TYPE OF WELL CASING	N/A, 7-inch H.S.A.	SCREEN PERFORATION N/A	DIAMETER OF BORING (in)		DIAMETER OF WELL (in) –
NO. OF SAMPLES	DIST 0	UNDIST 10	CORE –	LOGGED BY H. Reyes	CHECKED BY [illegible]
WATER DEPTH (ft)	FIRST None	COMPL –	24 HRS. –		

DEPTH (feet)	DESCRIPTION	WELL LOG	SAMPLE INFORMATION No.	Type	Blow Count	O.V.A. (ppm)	Drilling Rate (Time)	REMARKS
	Asphalt.							
	Moist, dark yellowish brown, SILTY SAND.						0858	Background O.V.A reading = 2-4 ppm
	Moist, dark yellowish brown, CLAY (CH).							
5			1	X	N/R	3	0905	No odor.
10	Becomes yellowish brown with trace of organics, decomposed roots.		2	X	30	3	0913	No odor.
	Medium dense, moist, olive brown, very fine grained SILTY SAND (SM) to SANDY SILT (ML).							
15			3	X	17	10	0920	No odor.
20	Becomes olive gray.		4	X	18	210	0950	Moderate hydrocarbon odor.
25			5	X	21	325	1005	Moderate hydrocarbon odor.
30	Color changes to dark olive brown.		6	X	22	6	200	Slight to moderate hydrocarbon.
	Dense, moist, light olive brown, fine grained, SILTY SAND (SM).							
35			7	X	40	6	1035	No odor.
	Les silt.							

Project: DOUGLAS – TORRANCE
Project No.: 8741863C

LOG OF BORING B-4 (ST)

A-5

WOODWARD-CLYDE CONSULTANTS

DEPTH (feet)	DESCRIPTION	WELL LOG	No.	Type	Blow Count	O.V.A. (ppm)	Drilling Rate (1)	REMARKS
40	(continued) Very dense, moist, light olive brown, fine to medium grained SAND (SP-SM) to SILTY SAND		8	X	56	3	1054	No odor.
	Dense, very moist, yellowish brown, fine grained CLAYEY SAND (SC), with shell fragments							
45	Stiff to very stiff, olive to olive brown, SANDY SILT (ML), with iron oxide stains.		9	X	39	12	1110	No odor.
50			10	X	36	12	1150	No odor.
	Bottom of Boring at 50.6 feet.							Angle drilled 22° due south.
55								
60								
65								
70								
75								
80								

Project: DOUGLAS – TORRANCE
Project No.: 8741863C

CONT. LOG OF BORING B-4 (ST)

BORING LOCATION	B-5 (8T) See Figure		ELEVATION AND DATUM	Not Available	
DRILLING AGENCY	A & R Drilling, Inc.	DRILLER M. Smith	DATE STARTED	12-17-87	DATE FINISHED 12-17-87
DRILLING EQUIPMENT	CME 75, 7-inch H.S.A.		COMPLETION DEPTH (ft)	45.6	ROCK DEPTH (ft) –
TYPE OF WELL CASING	N/A	SCREEN PERFORATION N/A	DIAMETER OF BORING (in.)	7	DIAMETER OF WELL (in.) –
NO. OF SAMPLES	DIST. –	UNDIST. 6	CORE –	LOGGED BY B. Jacobs	CHECKED BY P. Giesmann
WATER DEPTH (ft)	FIRST –	COMPL. –	24 HRS. –		

DEPTH (feet)	DESCRIPTION	WELL LOG	SAMPLE INFORMATION No.	Type	Blow Count	O.V.A. (ppm)	Drilling Rate (Time)	REMARKS
	Asphalt						0800	Background OVA reading = 4-6 ppm
	Slightly damp, reddish brown, SANDY SILT (SM), with some CLAY.							
5	Damp, reddish black, SILTY CLAY (CL).							
10								
	Damp, light olive brown to light yellowish brown SILTY CLAY to CLAYEY SILT (ML-CL).							
15								
20			1	X		20		No odor.
	Damp, grayish olive to olive gray, SANDY SILT (SM-ML), with some CLAY.							
25			2	X		80	0845	Strong hydrocarbon odor.
30	Becoming more clayey.		3	X		60		Strong to moderate hydrocarbon odor.
	Damp, dusky yellow, SANDY SILT (SM-ML), with same CLAY.							
35			4	X		30	0910	Slight hydrocarbon odor.

Project: DOUGLAS AIRCRAFT-TORRANCE
Project No.: 8741863C

LOG OF BORING B-5 (8T)

Fig. A 7

WOODWARD-CLYDE CONSULTANTS

DEPTH (feet)	DESCRIPTION	WELL LOG	No.	Type	Blow Count	O.V.A. (ppm)	Drilling Rate (T.)	REMARKS
40	Damp, dusky yellow, SANDY SILT (SM).							
	Damp, moderate brown to moderate yellowish brown, fine grained SAND (SP), with little silt.		5			9	0930	No odor.
45			6			7	0945	No odor.
	Bottom of Boring at 45.6 feet.							Note: Angle drilled at 22° due south.
50								
55								
60								
65								
70								
75								
80								

Project: DOUGLAS AIRCRAFT–TORRANCE
Project No.: 8741863C

CONT. LOG OF BORING B–5 (8T)

Fig. A-8

WOODWARD–CLYDE CONSULTANTS

APPENDIX C

MACCO ANALYTICAL RESULTS

(L-ABC/DAC8T)

certified testing laboratories, inc.
2905 EAST CENTURY BLVD. • SOUTH GATE, CALIF. 90280 • (213) 564-2641

LABORATORY NO 85679 REPORTED 03-23-87

CLIENT Mc Donnell Douglas
19503 S. Normandie Avenue
Torrance, CA 90502
Attn: Don Gerber
C6-13

SAMPLED

RECEIVED 03-12-87

SAMPLE Soil

MARKS 03-11-87 11:00 am 8T Salvage yard P.O. #7BZ683591

BASED ON SAMPLE As received

RESULTS

	Method 418.1	
South End of Tank	<15	mg/Kg
North End of Tank	2000	mg/Kg

Respectfully submitted,
CERTIFIED TESTING LABORATORIES, INC.

Stuart E. Salot, Ph.D.

RECEIVED MAR 1 8 1987

GEOTEST

An Environmental Monitoring and Testing Service

FIELD LABORATORY RESULTS REPORT

PREPARED FOR

CONCRETE CUTTING - MCDONNELL DOUGLAS

ANALYSIS OF HYDROCARBON CONTENT BY INFRARED SPECTROMETRY
EPA METHOD 418.1

DATE RECEIVED : March 11, 1987
DATE OF ANALYSIS : March 11, 1987
PROJECT NUMBER : 86515-04

SAMPLE ID #	CONCENTRATION (mg/kg)	
86515-04-1	1.4	SO. END 2'
86515-04-2	270.	FILL END 2' (NORTH

Analyst: RB Reviewed & Approved: [signature]

*NOTE: Samples were received in a chilled state, intact and with Chain-of-Custody attached.

GEOTEST is a division of GEOSERVICES, a California corporation
Post Office Box 90911 Long Beach California 90809-0911 (213) 498-9515 (800) 624-8744

GEOTEST

An Environmental Monitoring and Testing Service

FIELD LABORATORY RESULTS REPORT

PREPARED FOR

CONCRETE CUTTING - MC DONNELL DOUGLAS

ANALYSIS OF HYDROCARBON CONTENT BY INFRARED SPECTROMETRY

EPA METHOD 418.1

DATE RECEIVED : 03/17/87
DATE OF ANALYSIS : 03/17/87
PROJECT NUMBER : 86513-04

SAMPLE ID #	CONCENTRATION (mg/kg)
86513-04-03	3286. FILL END 4'
86513-04-04	1725. " " 6'

Analyst: _____ Reviewed & Approved: _____

*NOTE: Samples were received in a chilled state, intact and with Chain-of-Custody attached.

GEOTEST is a division of GEOSERVICES, a California corporation

Post Office Box 90911 Long Beach, California 90809-0911 (213) 498-9515 (800) 624-5744

APPENDIX D

WCC ANALYTICAL RESULTS

(L-ABC/DAC8T)

April 17, 1987

WOODWARD-CLYDE
203 N. Golden Circle Drive
Santa Ana, CA 92705

Attn: Allistair Callendar

JOB NO. 5664

WEST COAST
ANALYTICAL
SERVICE, INC.
ANALYTICAL CHEMISTS

LABORATORY REPORT

Samples: Forty (40) soil samples
Date Received: 4-10-87
Purchase Order No: Project 41863B

Fifteen (15) soil samples were analyzed for hydrocarbon content according to a modified EPA method 8015. The results are reported in the following table.

Jim Bonde
Senior Chemist

D.J. Northington, Ph.D.
Technical Director

9840 Alburtis Avenue • Santa Fe Springs, California 90670 • 213/948-2225

WEST COAST ANALYTICAL SERVICE, INC.

Woodward-Clyde
Mr. Allistair Callendar

Job # 5664
April 17, 1987

LABORATORY REPORT

Parts Per Million

Sample No.	Gasoline	Diesel Fuel	Kerosene	Mineral Spirits	C_{18}-C_{30+} Hydrocarbon
B1-1-3-3	ND	ND	3030	ND	1300
B1-1-5-3	ND	ND	ND	ND	ND
B1-1-6-3	ND	ND	ND	ND	ND
B1-1-7-3	ND	ND	ND	ND	ND
B2-2-2-3	ND	ND	ND	ND	ND
B2-2-3-3	ND	ND	ND	ND	ND
B2-2-4-3	ND	ND	9500	ND	9700
B2-2-5-3	ND	ND	1900	ND	2800
B2-2-7-3	ND	ND	ND	ND	ND
B3-3-1-3	ND	ND	ND	ND	ND
B3-3-2-3	ND	ND	ND	ND	ND
B3-3-3-3	ND	ND	ND	ND	ND
SP-1	ND	ND	ND	ND	310
Detection Limit	10	10	10	10	100

Sample No.	Gasoline	Diesel Fuel	Kerosene	Mineral Spirits	C_{9}-C_{30+} Hydrocarbon
B2-2-6-3	ND	ND	ND	ND	4600
SP-2	ND	ND	ND	ND	680
Detection Limit	10	10	10	10	100

Date Analyzed: 4-16-1987

ND - Not Detected

WCAS

December 9, 1987

WOODWARD-CLYDE CONSULTANTS
203 N. Golden Circle Dr.
Santa Ana, CA 92705

Attn: Alistaire Callender

JOB NO. 7933 "A"

LABORATORY REPORT

Samples Received: Twenty-eight (28) soil samples
Date Received: 12-2-87
Purchase Order No: 8741863C

The samples were analyzed as follows:

Samples Analyzed	Analysis	Results
Eight (8) soil	Fuel Hydrocarbons by modified EPA 8015	Table I

James Bonde
Senior Chemist

D.J. Northington, Ph.D.
Technical Director

WEST COAST ANALYTICAL SERVICE, INC.

WOODWARD-CLYDE CONSULTANTS
Mr.Alistaire Callender

Job # 7933
December 9, 1987

LABORATORY REPORT

TABLE I

Parts Per Million

Sample No.	Gasoline	Mineral Spirits	Kerosene	Diesel Fuel	C_{20}-C_{30} Hydrocarbons
7-3-3	ND	ND	ND	ND	ND
7-4-3	ND	ND	ND	ND	ND
7-5-3	ND	ND	6400	ND	27,000
7-6-3	ND	ND	72	ND	360
7-7-3	ND	ND	ND	ND	ND
8TPL-3	ND	ND	ND	ND	TR
8TPL-5	ND	ND	ND	ND	ND
8TPL-7	ND	ND	ND	ND	ND
Detection Limit	10	10	10	10	100

ND-Not Detected
TR-Trace

Date Analyzed: 12-7-87 to 12-8-87

December 22, 1987

WEST COAST ANALYTICAL SERVICE, INC.
ANALYTICAL CHEM

"F"

WOODWARD-CLYDE
203 N. Golden Circle Drive
Santa Ana, CA 92705

Attn: Alistaire Callendar

JOB NO. 8092

LABORATORY REPORT

Samples Received: Thirteen (13) soil samples
Date Received: 12-17-87
Purchase Order No: 8741863C/Douglas Aircraft

The samples were analyzed as follows:

Samples Analyzed	Analysis	Results
8 soils	Fuel Hydrocarbons by Modified EPA 8015	Table I

TABLE I

Parts Per Million

Sample	Gasoline	Mineral Spirits	Kerosene	Diesel Fuel	C_{20}-C_{30} Hydrocarbons
1	ND	ND	ND	ND	550
2	ND	ND	ND	ND	540
3	ND	ND	ND	ND	ND
B-5-1-3	ND	ND	ND	ND	ND
B-5-2-4	ND	ND	150	ND	1000
B-5-3-3	ND	ND	1100	ND	5800
B-5-4-3	ND	ND	4200	ND	5900
B-5-5-3	ND	ND	ND	ND	ND
Detection Limit	10	10	10	10	100

Date Analyzed: 12/19-20/87

James Bonde
Senior Chemist

D.J. Northington, Ph.D.
Technical Director

9840 Alburtis Avenue • Santa Fe Springs, California 90670 • 213/948-2225

January 6, 1988

WOODWARD-CLYDE
203 N. Golden Circle Drive
Santa Ana, CA 92705

Attn: Allistair Callendar

JOB NO. 8216

LABORATORY REPORT

Samples Received: Five (5) soil samples
Date Received: 1-5-88
Purchase Order No: Proj: 8741863C/Douglas Aircraft

The samples were analyzed as follows:

Samples Analyzed	Analysis	Results
Five soils	Fuel Hydrocarbons by modified EPA 8015	Table I

TABLE I

Parts Per Million

Sample No.	Gasoline	Mineral Spirits	Kerosene	Diesel Fuel	C_{15}-C_{30} Hydrocarbons
SP-1	ND	ND	ND	ND	ND
SP-2	ND	ND	ND	ND	160
SP-3	ND	ND	ND	ND	ND
SP-4	ND	ND	ND	ND	ND
SP-5	ND	ND	ND	ND	ND
Detection Limit	10	10	10	10	100

ND - Not Detected

Date Analyzed: 1-5-88

James Bonde
Senior Chemist

D.J. Northington, Ph.D.
Technical Director

January 14, 1988

WOODWARD-CLYDE
203 N. Golden Circle Drive
Santa Ana, CA 92705

Attn: Allistair Callendar

JOB NO. 8253

WCAS
WEST COAST ANALYTICAL SERVICE, INC.
ANALYTICAL CHEM...

LABORATORY REPORT

Samples Received: One (1) soil sample in duplicate & one (1) water sample in duplicate
Date Received: 1-8-88
Purchase Order No: 8741863C-1000/Douglas Aircraft

The samples were analyzed as follows:

Samples Analyzed	Analysis	Results
One water	Volatile Organics by EPA 8240	Data Sheets
One soil	Fuel Hydrocarbons by modified EPA 8015	Table I

TABLE I

Parts Per Million

Sample No.	Gasoline	Diesel Fuel	Kerosene	Mineral Spirits
Trench 1A	ND	ND	ND	ND
Detection Limit	10	10	10	10

ND - Not Detected

Date Analyzed: 1-11-88

Page 1 of 1

Michael Shelton
Senior Chemist

D. J. Northington, Ph. D.
Technical Director

9640 Alburtis Avenue • Santa Fe Springs, California 90670 • 213 948-2225

Woodward·Clyde Consultants

SHIPMENT NO.: _____

5664

CHAIN OF CUSTODY RECORD

PAGE 1 OF 7

PROJECT NAME: Douglas Aircraft - Torrance

DATE 4/10/87

PROJECT NO: 41863B

18T

Sample Number	Location	Type of Sample: Material	Type of Sample: Method	Type of Container	Type of Preservation: Temp	Type of Preservation: Chemical	Analysis Required*
B1-1-1-3		Soil	CMS	Brass Tube	Cool	—	A. Collected to Cell TN.
-1-1-4							
-1-2-3							
-1-2-4							
-1-3-3	-1-3-4						
-1-4-3							
-1-4-4							
-1-5-3							
-1-5-4							
-1-6-3							
-1-6-4							
-1-7-3							
-1-7-4							
B2-2-1-3							
-2-1-4							
-2-2-3							
-2-2-4							
-2-3-3							
-2-3-4							
-2-4-3							

Total Number of Samples Shipped: 39 (40) | Sampler's Signature:

Relinquished By: Signature: Brian Jacobs; Printed Name: BRIAN JACOBS; Company: Woodward Clyde; Reason: Analysis	Received By: Signature: Margaret Falt; Printed Name: Margaret Falt; Company: JWCAS	Date: 4/10/87; Time: 5:10 pm
Relinquished By: Signature: ; Printed Name: ; Company: ; Reason:	Received By: Signature: ; Printed Name: ; Company:	Date: / / ; Time:
Relinquished By: Signature: ; Printed Name: ; Company: ; Reason:	Received By: Signature: ; Printed Name: ; Company:	Date: / / ; Time:
Relinquished By: Signature: ; Printed Name: ; Company: ; Reason:	Received By: Signature: ; Printed Name: ; Company:	Date: / ; Time:

Special Shipment / Handling / Storage Requirements.

* Note – This does not constitute authorization to proceed with analysis

LA OR-C6E-42

#5664

Woodward-Clyde Consultants

CHAIN OF CUSTODY RECORD

SHIPMENT NO.:

PAGE 1 OF 2

PROJECT NAME: Douglas Aircraft - Torrance

DATE 4/10/87

PROJECT NO.: 41863B

18T

Sample Number	Location	Type of Sample		Type of Container	Type of Preservation		Analysis Required*
		Material	Method		Temp	Chemical	
B-2-2-4-4		Soil	CMS	Brass Tube	Cool	—	A. Collection to call - IV
-2-5-3		↓	↓	↓	↓	↓	
-2-5-4							
-2-6-3							
-2-6-4							
-2-7-3							
-2-7-4							
-2-8-3							
-2-8-4							
B-3-3-1-3							
-3-1-4							
-3-2-3							
-3-2-4							
-3-3-3							
-3-3-4							
SP-1							
SP-2							
Bag 1							
Bag 2		↓	↓	↓	↓	↓	

Total Number of Samples Shipped: (40) | Sampler's Signature:

Relinquished By:	Received By:	Date / Time
Signature: Brian Jacobs Printed Name: Brian Jacobs Company: West Coast Analytical Reason: Analysis	Signature: Margaret Felt Printed Name: Margaret Felt Company: WCAS	Date 4/10/87 Time 5:10pm
Signature: Printed Name: Company: Reason:	Signature: Printed Name: Company:	Date / / Time
Signature: Printed Name: Company: Reason:	Signature: Printed Name: Company:	Date / / Time
Signature: Printed Name: Company: Reason:	Signature: Printed Name: Company:	Date / / Time

Special Shipment / Handling / Storage Requirements:

* Note — This does not constitute authorization to proceed with analysis

LA CF-0180-42

Woodward·Clyde Consultants

CHAIN OF CUSTODY RECORD

SHIPMENT NO.: ______

PAGE 1 OF 2

DATE 12 2 87

PROJECT NAME: Douglas Aircraft

PROJECT NO.: 8741863C-1000

Sample Number	Location	Type of Sample: Material	Type of Sample: Method	Type of Container	Type of Preservation: Temp	Type of Preservation: Chemical	Analysis Required*
7-1-3		Soil	DMS	Brass Tube	ICED	NONE	Hold
" " 4							
7-2-3							
" " 4							
7-3-3							8015
" "-4							Hold
7-4-3							8015
" "-4							Hold
7-5-3							8015
" "-4							Hold
7-6-3							8015
" "-4							Hold
7-7-3							8015
7-7-4							Hold
7-8-1							
7-8-2							
7-9-3							
7-9-4							
7-10-3							
7-10-4							

Total Number of Samples Shipped: 28 | Sampler's Signature: Brian Jacobs

Relinquished By:	Received By:	Date / Time
Signature: Brian Jacobs Printed Name: Brian Jacobs Company: Woodward-Clyde Reason: Transport	Signature: Charles Schunn Printed Name: Charles Schunn Company: A I Messinger	Date: 12 2 87 Time: 2:25
Signature: Charles Schunn Printed Name: Company: A I Messinger Reason:	Signature: R Northington Printed Name: R Northington Company: WCAS, Inc #7933	Date: 12 2 87 Time: 3:20pm
Signature: Printed Name: Company: Reason:	Signature: Printed Name: Company:	Date: Time:
Signature: Printed Name: Company: Reason:	Signature: Printed Name: Company:	Date: Time:

Special Shipment / Handling Storage Requirements

* Note – This does not constitute authorization to proceed with analysis

Woodward-Clyde Consultants

SHIPMENT NO.: _____

CHAIN OF CUSTODY RECORD

PAGE 2 OF 2

DATE 12/2/87

PROJECT NAME: Douglas Aircraft

PROJECT NO.: 87416B3C-1020

Sample Number	Location	Type of Sample: Material	Type of Sample: Method	Type of Container	Type of Preservation: Temp	Type of Preservation: Chemical	Analysis Required*
BTPL-1		Soil	Grab	Brass Tube	ICED	NONE	Hold
" -2							Hold
" -3							8015
" -4							Hold
" -5							8015
" -6							Hold
" -7							8015
" -8							Hold

Total Number of Samples Shipped: 28 | Sampler's Signature: Brian Jones

Relinquished By: Signature: Brian Jones; Printed Name: Brian Jones; Company: Woodward-Clyde; Reason: Transport	Received By: Signature: Charles Schurr; Printed Name: Charles Schurr; Company: AT Messenger	Date: 12/2/87; Time: 2:25
Relinquished By: Signature: Charles Schurr; Printed Name: ; Company: AT messenger; Reason:	Received By: Signature: R Northington; Printed Name: R Northington; Company: WCAS, Inc #7933	Date: 12/2/87; Time:
Relinquished By: Signature: ; Printed Name: ; Company: ; Reason:	Received By: Signature: ; Printed Name: ; Company:	Date: / / ; Time:
Relinquished By: Signature: ; Printed Name: ; Company: ; Reason:	Received By: Signature: ; Printed Name: ; Company:	Date: / / ; Time:

Special Shipment Handling Storage Requirements

* Note — This does not constitute authorization to proceed with analysis

LA CH-01[illegible]

Woodward-Clyde Consultants

SHIPMENT NO.: _____

CHAIN OF CUSTODY RECORD

PAGE 1 OF _____

PROJECT NAME: [illegible] Furnace DATE 12/17/[illegible]

PROJECT NO.: [illegible]

Sample Number	Location	Type of Sample		Type of Container	Type of Preservation		Analysis Required*
		Material	Method		Temp	Chemical	
B-5-1-3		Soil	CMS	Brass Tube	Cool	None	
B-5-2-4							
B-5-3-3							
B-5-3-4							
B-5-4-3							
B-5-5-3							
B-5-5-4							
B-5-6-3							
B-5-6-4			J'				
[illegible]	✓		[illegible]				
" " -2							
" " -3		↓	↓	↓	↓	↓	
		↓	↓	↓	↓	↓	

Total Number of Samples Shipped: 12 | Sampler's Signature: [illegible]

Relinquished By: Signature [illegible] Printed Name [illegible] Company [illegible] Reason [illegible]	Received By: Signature [illegible] Printed Name [illegible] Company [illegible] #8092	Date [illegible] Time [illegible]
Relinquished By: Signature _____ Printed Name _____ Company _____ Reason _____	Received By: Signature _____ Printed Name _____ Company _____	Date _____ Time _____
Relinquished By: Signature _____ Printed Name _____ Company _____ Reason _____	Received By: Signature _____ Printed Name _____ Company _____	Date _____ Time _____
Relinquished By: Signature _____ Printed Name _____ Company _____ Reason _____	Received By: Signature _____ Printed Name _____ Company _____	Date _____ Time _____

Special Shipment Handling Storage Requirements:

* Note – This does not constitute authorization to proceed with analysis

LA OFFICE

Woodward-Clyde Consultants

CHAIN OF CUSTODY RECORD

SHIPMENT NO.: ______

PAGE 1 OF 1

DATE 1 5 90

PROJECT NAME: Douglas Aircraft

PROJECT NO.: 8741863C -1000

Sample Number	Location	Type of Sample: Material	Type of Sample: Method	Type of Container	Type of Preservation: Temp	Type of Preservation: Chemical	Analysis Required*
SP-1		Soil	Grab	Brass tube	Cool	NONE	Hold
" -2		↓	↓	↓	↓	↓	8015
" -3		↓	↓	↓	↓	↓	8015
" -4		↓	↓	↓	↓	↓	8015
" -5		↓	↓	↓	↓	↓	8015

RUSH (samples -2 to -5)

Total Number of Samples Shipped 5 | Sampler's Signature: Brian Jacobs

Relinquished By:	Received By:	Date / Time
Signature Brian Jacobs Printed Name Brian Jacobs Company Woodward - Clyde Reason Analysis	Signature [signature] Printed Name [illegible] Company [illegible] #8210	Date 1 5 90 Time 7:55 am
Signature Printed Name Company Reason	Signature Printed Name Company	Date Time
Signature Printed Name Company Reason	Signature Printed Name Company	Date Time
Signature Printed Name Company Reason	Signature Printed Name Company	Date Time

Special Shipment Handling Storage Requirements: RUSH 48 #8210

* [illegible] — This does not constitute authorization to proceed with analysis

LA [illegible]

BOE-C6-0014498

APPENDIX E

LETTER TO L.A. REGIONAL WATER QUALITY CONTROL BOARD

(L-ABC/DACST)

200 North Golden Circle Drive
Santa Ana, CA 92705
714 835-6886
213 881-7164
Telex 68-0421

Woodward-Clyde Consultants

4 January 1988
Project No. 8741863C

Mr. Jeff Copeland
Regional Water Quality Control Board
Los Angeles Region
107 south Broadway, Room 4027
Los Angeles, California 90012

SUBJECT: PROPOSED REMEDIATION AT TANK 8T AT THE DOUGLAS AIRCRAFT COMPANY'S TORRANCE FACILITY

Dear Mr. Copeland:

The purpose of this letter is to present to the Regional Water Quality Control Board a method of remediating the petroleum hydrocarbons present in the Tank 8T excavation at the Torrance facility of Douglas Aircraft Company. The approach described in this letter was discussed at a meeting on 21 December 1987 between you, Kent Adams and Melissa Henck of Douglas Aircraft Company, and Alistaire Callender of Woodward-Clyde Consultants.

As explained at the meeting and during a subsequent conference call on Wednesday, 23 December 1987 between you, Alistaire Callender and Melissa Henck, we propose excavating soil with total petroleum hydrocarbon concentrations greater than 1,000 mg/kg, and disposing of this soil at a landfill permitted to accept it. Soil with petroleum hydrocarbon concentrations less than 1000 mg/kg may be left in place, if excavating deep enough to remove it will threaten the stability of the building adjacent to the excavation. Soil samples will be collected from the sides and bottom of the excavation, to evaluate the concentrations of petroleum hydrocarbons left in place. No soil with total petroleum hydrocarbon concentrations greater than 1,000 mg/kg will be left in place. In addition the total petroleum hydrocarbon analyses, two samples from the bottom of the excavation will be analyzed by modified EPA 8015, to evaluate the concentrations of BTXE in the soil.

The excavation will be backfilled with lean concrete to 5 feet below ground surface, and then brought up to the surface using clean compacted soil previously removed from the hole. The excavation will be backfilled with lean concrete to reduce settlement. If soil were to be used to backfill the hole, it would be necessary to shore the excavation prior to anyone entering the hole to run compaction tests. These tests will be necessary to confirm

Mr. Jeff Copeland 4 January 1988

that the required level of soil compaction had been achieved. With lean concrete, no compaction tests will be necessary except from the surface to a depth of two feet. No shoring is required in an excavation of this depth.

Soil put back into the excavation will have petroleum hydrocarbon concentrations less than 100 mg/kg. Most of the soil already excavated contains hydrocarbon concentrations of less than 10 mg/kg. Once the excavation has been filled and compacted, a low permeability asphalt cover will be put in place. This asphalt cover will incorporate a fabric liner, which will increase its strength and reduce its water permeability.

The bottom of the excavation will be sampled, and the samples analyzed for hydrocarbons, prior to backfilling. The results of the soil analyses and compaction tests will be submitted to the LARWQCB for review after the job has been completed. The Board will be kept verbally appraised of the remediation as it progresses.

Very truly yours,

WOODWARD-CLYDE CONSULTANTS

Alistaire Callender, Ph.D.
Project Manager
(ABC/Copeland)

AC:lk

cc: Janet Bell, Douglas Aircraft Company
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January 18, 1988
Project No. 8741863C

Mr. Jeff Copeland
California Regional Water Quality Control Board
Los Angeles Region
107 South Broadway, Room 4027
Los Angeles, California 90012

SUBJECT: REMEDIATION PROPOSAL FOR TANK 8T EXCAVATION AT DOUGLAS AIRCRAFT COMPANY'S TORRANCE (C6) FACILITY

Dear Mr. Copeland:

I would like to confirm your approval of the remedial measures proposed for the Tank 8T excavation at Douglas Aircraft Company's Torrance (C6) facility. The plan approved by you was described in the letter of December 28, 1987 submitted to the Regional Water Quality Control Board. Your approval was given via a telephone call on December 31, 1987.

There exists some ambiguity as to what levels of petroleum hydrocarbon RWQCB may consider a threat to ground water. Regardless, Douglas Aircraft Company intends to proceed conservatively in the instance and tentatively plans on removing soil with hydrocarbon concentrations greater than 100 mg/kg.

Sincerely yours,

WOODWARD-CLYDE CONSULTANTS

Alistaire Callender

Alistaire Callender, Ph.D.
Project Manager

AC:lk
(ABC/ABC-002)

cc: Janet Bell, Douglas Aircraft Company
Melissa Henck, Douglas Aircraft Company
Bob Fassbender, McDonnell Douglas
Kent Adams, Douglas Aircraft Company